

SECTION - 4

Geometry

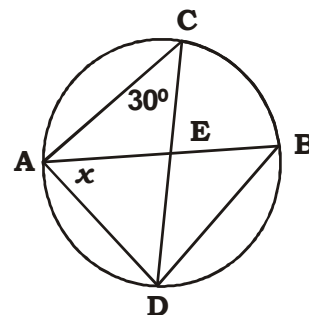
1. Similarity
2. Loci
3. Circles, Tangents and Intersecting Chords
4. Construction

Submission Date : / /

Geometry Assignment Sheet

2003

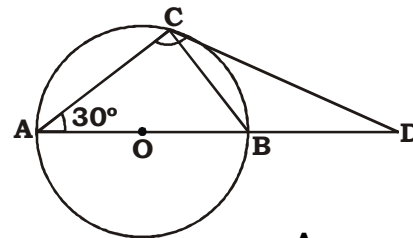
- In a triangle PQR, L and M are two points on the base QR, such that $\angle LPQ = \angle QRP$ and $\angle RPM = \angle RQP$. Prove that :
 - $\Delta PQL \sim \Delta RPM$
 - $QL \cdot RM = PL \cdot PM$
 - $PQ^2 = QR \cdot QL$



- In the given circle with diameter AB, find the value of x .

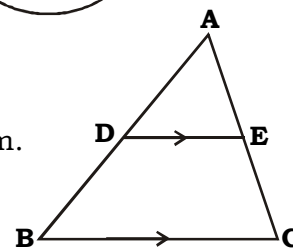
2004

- In the figure, AB is a diameter and AC is a chord of a circle such that $\angle BAC = 30^\circ$. The tangent at C intersects AB produced at D. Prove that $BC = BD$



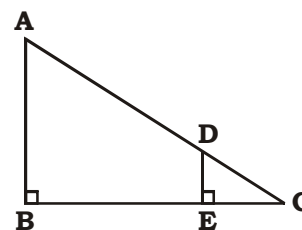
- In the given figure, $DE \parallel BC$.
 - Prove that ΔADE and ΔABC are similar.
 - Given that $AD = \frac{1}{2}BD$, calculate DE, if $BC = 4.5$ cm.

Also, find $\frac{\text{Ar.}(\Delta ADE)}{\text{Ar.}(\Delta ABC)}$ and $\frac{\text{Ar.}(\Delta ADE)}{\text{Ar.}(\text{trapezium BCED})}$

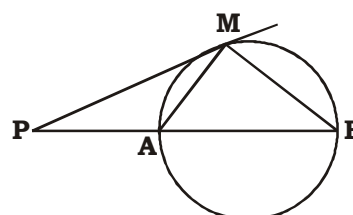


2005

- In the given figure, AB and DE are perpendicular to BC. If $AB = 9$ cm, $DE = 3$ cm and $AC = 24$ cm, calculate AD.
- PQR is a right-angled triangle with $PQ = 3$ cm and $QR = 4$ cm. A circle which touches all the sides of the triangle is inscribed in the triangle. Calculate the radius of the circle.



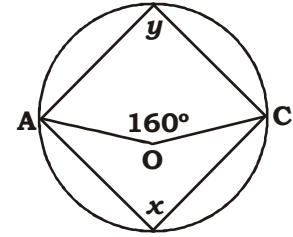
- In the figure, PM is a tangent to the circle and $PA = AM$. Prove that :
 - ΔPMB is isosceles.
 - $PA \cdot PB = MB^2$



4. A circle with centre O, diameter AB and a chord AD is drawn. Another circle is drawn with AO as diameter to cut AD at C. Prove that $BD = 2OC$.

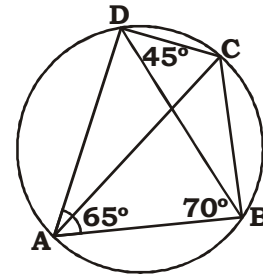
5. Using a ruler and compass only :
 (i) construct a triangle ABC with $BC = 6$ cm, $\angle ABC = 120^\circ$ and $AB = 3.5$ cm.
 (ii) In the above figure, draw a circle with BC as diameter. Find a point 'P' on the circumference of the circle which is equidistant from AB and BC measure $\angle BCP$.

6. In the given figure, O is the centre of the circle and $\angle AOC = 160^\circ$. Prove that $3 \angle y - 2 \angle x = 140^\circ$

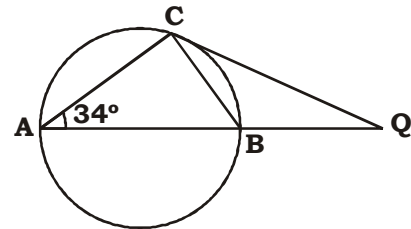


2006

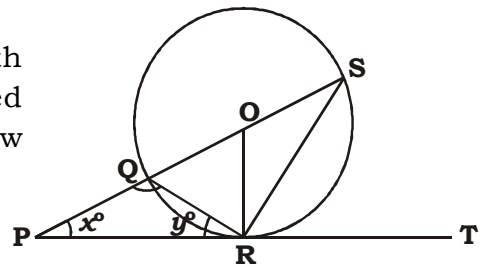
1. In the above figure $\angle BAD = 65^\circ$, $\angle ABD = 70^\circ$ and $\angle BDC = 45^\circ$. Find :
 (i) $\angle BCD$
 (ii) $\angle ADB$
 Hence show that AC is a diameter.



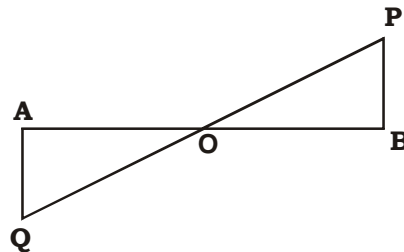
2. In the given figure, AB is a diameter. The tangent at C meets AB Produced at Q. If $\angle CAB = 34^\circ$, find :
 (i) $\angle CBA$
 (ii) $\angle CQA$



3. In the given figure, PT touches a circle with centre O at R. Diameter SQ when produced meets PT at P, $\angle SPR = x^\circ$ and $\angle QRP = y^\circ$, show that $x^\circ + 2y^\circ = 90^\circ$.



4. In the figure given above, PB and QA are perpendiculars to the line segment AB. If $PO = 6$ cm, $QO = 9$ cm and the area of $\Delta POB = 120$ cm², find the area of ΔQOA .

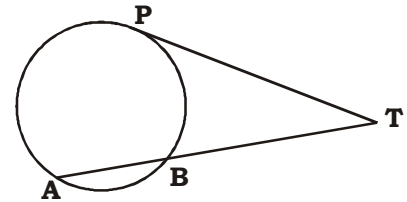


5. Use a ruler and a pair of compasses to construct ΔABC in which $BC = 4.2$ cm, $\angle ABC = 60^\circ$ and $AB = 5$ cm. Construct a circle of radius 2 cm to touch both the arms of $\angle ABC$ of ΔABC .

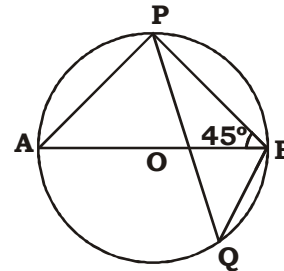
2007

- Using a ruler construct a triangle ABC with BC = 6.4 cm CA = 5.8 cm and $\angle ABC = 60^\circ$, Draw its incircle. Measure and record the radius of the incircle.

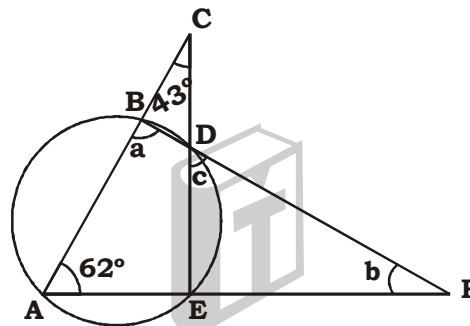
- In the figure given below, PT is a tangent to the circle. Find PT if AT = 16 cm and AB = 12 cm.



- In the given figure O is the centre of the circle and $\angle PBA = 45^\circ$. Calculate the value of $\angle PQB$.

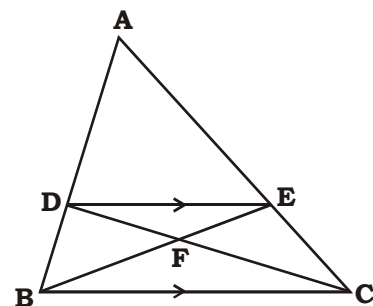


- In the given figure, if $\angle ACE = 43^\circ$ and $\angle CAF = 62^\circ$, find the values of a, b and c.



- In the given figure ABC is a triangle. DE is parallel to BC and $\frac{AD}{DB} = \frac{3}{2}$,

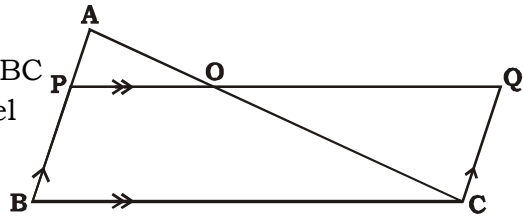
- Determine the ratios $\frac{AD}{AB}$ and $\frac{DE}{BC}$.
- Prove that $\triangle DEF$ is similar to $\triangle CBF$. Hence, find $\frac{EF}{FB}$.
- What is the ratio of the areas of $\triangle DFE$ and $\triangle BFC$?



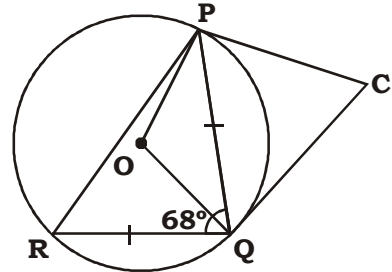
- Construct a triangle PBC given BC = 5 cm, BP = 4 cm and $\angle PBC = 45^\circ$
 - Complete the rectangle ABCD such that
 - P is equidistant from AB and BC
 - P is equidistant from C and D
 - Measure and record the length of AB.

2008

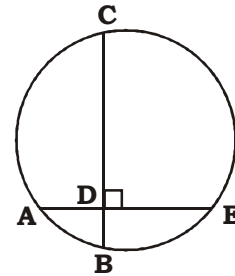
- In $\triangle ABC$, $AP : PB = 2 : 3$. PO is parallel to BC and is extended to Q so that CQ is parallel to BA . Find :
 - area $\triangle APO : \triangle ABC$
 - area $\triangle APO : \text{area } \triangle CQO$



- In the figure given below $PQ = QR$, $\angle RQP = 68^\circ$, PC and CQ are tangents to the circle with centre O . Calculate the values of :
 - $\angle QOP$
 - $\angle QCP$



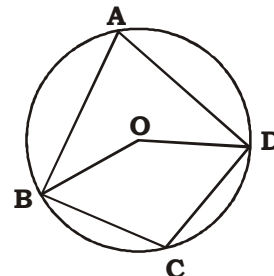
- In the given figure, AE and BC intersect each other at point D . If $\angle CDE = 90^\circ$, $AB = 5$ cm, $DB = 4$ cm and $CD = 9$ cm. find DE .



- A straight line AB is 8 cm long. Locate by construction the locus of a point which is :
 - Equidistant from A and B .
 - Always 4 cm from the line AB
 - Mark 2 points X and Y , which are 4 cm from AB and equidistant from A and B . Name the figure $AXBY$.
- Using a ruler and a pair of compasses only, construct :
 - a triangle ABC , given $AB = 4$ cm, $BC = 6$ cm and $\angle ABC = 90^\circ$.
 - a circle which passes through the points A , B and C and mark its centre as O .

2009

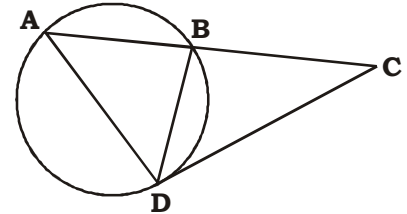
- In the given figure O is the centre of the circle, $\angle BAD = 75^\circ$ and chord $BC = \text{chord } CD$. Find
 - $\angle BOC$
 - $\angle OBD$
 - $\angle BCD$.



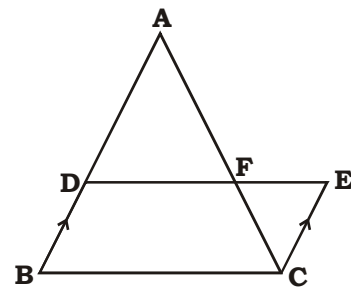
- The model of building is constructed with scale factor 1 : 30.
 - If the height of the model is 80 cm, find the actual height of the building in metres.
 - If the actual volume of a tank at the top of the building is 27 m^3 , find the volume of the tank on the top of the model.

3. Using ruler and compasses construct
 - (i) a triangle ABC in which $AB = 5.5$ cm, $BC = 3.4$ cm and $CA = 4.9$ cm.
 - (ii) the locus of points equidistant from A and C.
 - (iii) a circle touching AB at A passing through C.

4. In the above figure $AB = 7$ cm and $BC = 9$ cm.
 - (i) Prove $\triangle ACD \sim \triangle DCB$
 - (ii) Find the length of CD.

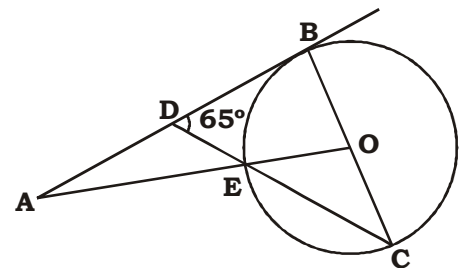


5. In the given figure, ABC and CEF are two triangles where BA is parallel to CE and $AF : AC = 5 : 8$.
 - (i) Prove that $\triangle ADF \sim \triangle CEF$
 - (ii) Find AD if $CE = 6$ cm.
 - (iii) If DF is parallel to BC find area of $\triangle ADF$: area of $\triangle ABC$.

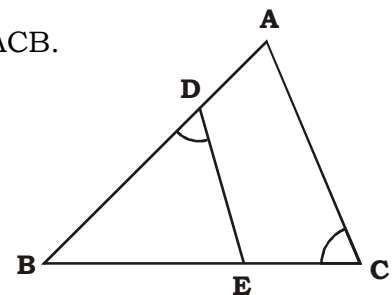


2010

1. In the following figure, O is the centre of the circle and AB is a tangent to it at point B. $\angle BDC = 65^\circ$, Find $\angle BAO$.



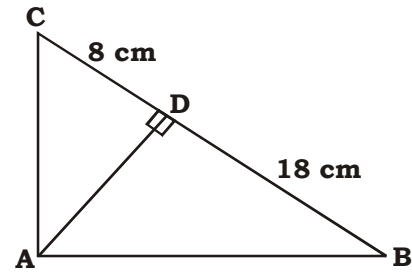
2. In the given figure ABC is a triangle with $\angle EDB = \angle ACB$. Prove that $\triangle ABC \sim \triangle EBD$. If $BE = 6$ cm, $EC = 4$ cm, $BD = 5$ cm and area of $\triangle BED = 9$ cm² calculate the
 - (i) length of AB
 - (ii) area of $\triangle ABC$



3. Use ruler and compasses only for this question
 - (i) Construct $\triangle ABC$, where $AB = 3.5$ cm, $BC = 6$ cm and $\angle ABC = 60^\circ$
 - (ii) Construct the locus of points inside the triangle which are equidistant from BA and BC.
 - (iii) Construct the locus of points inside the triangle which are equidistant from B and C.
 - (iv) Mark the point P which is equidistant from AB, BC and also equidistant from B and C. Measure and record the length of PB.
4. Construct a regular hexagon of side 4 cm. Construct a circle circumscribing the hexagon.

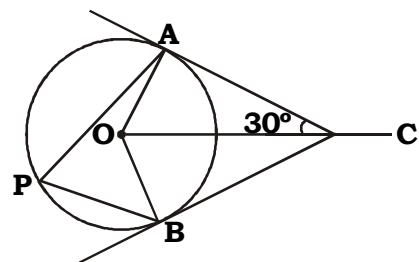
2011

- In the adjoining figure ABC is a right angled triangle with $\angle BAC = 90^\circ$.
 - Prove $\triangle ADB \sim \triangle CDA$.
 - If $BD = 18$ cm, $CD = 8$ cm, find AD.
 - Find the ratio of the area of $\triangle ADB$ is to area of $\triangle CDA$

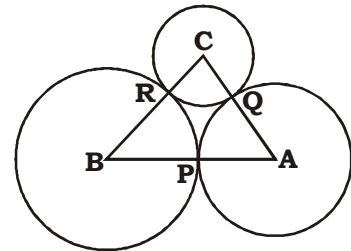


- Draw a circle of radius 3.5 cm. Mark a point P outside the circle at a distance of 6 cm from the centre. Construct two tangents from P to the given circle. Measure and write down the length of one tangent.

- In the given figure, O is the centre of the circle. Tangents at A and B meet at C. If $\angle ACO = 30^\circ$, find :
 - $\angle BCO$
 - $\angle AOB$
 - $\angle APB$

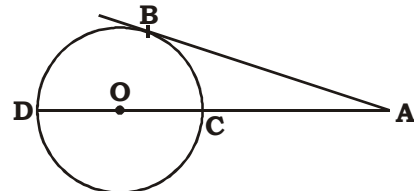


- ABC is a triangle with $AB = 10$ cm, $BC = 8$ cm and $AC = 6$ cm (not drawn to scale). Three circles are drawn touching each other with the vertices as their centres. Find the radii of the three circles.

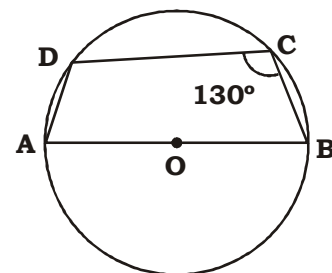


2012

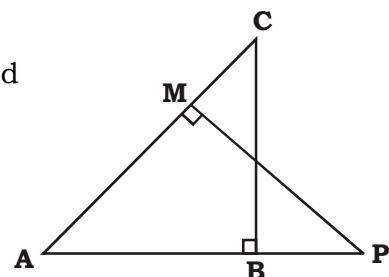
- In the given figure O is the centre of the circle and AB is a tangent at B. If $AB = 15$ cm and $AC = 7.5$ cm. Calculate the radius of the circle.



- In the given figure, AB is the diameter of a circle with centre O. $\angle BCD = 130^\circ$. Find :
 - $\angle DAB$
 - $\angle DBA$

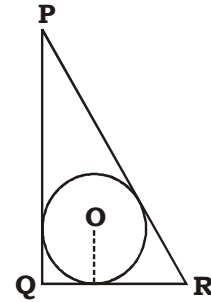


- In the given figure $\triangle ABC$ and $\triangle AMP$ are right angled at B and M respectively. Given $AC = 10$ cm, $AP = 15$ cm and $PM = 12$ cm.
 - Prove $\triangle ABC \sim \triangle AMP$
 - Find AB and BC



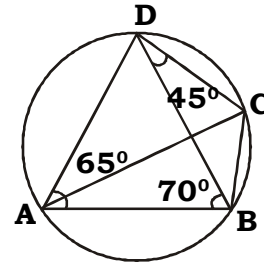
4. Construct a triangle ABC in which base BC = 6 cm, AB = 5.5 cm and $\angle ABC = 120^\circ$
 (i) Construct a circle circumscribing the triangle ABC.
 (ii) Draw a cyclic quadrilateral ABCD so that D is equidistant from B and C.

5. In triangle PQR, PQ = 24 cm, QR = 7 cm and $\angle PQR = 90^\circ$.
 Find the radius of the inscribed circle.

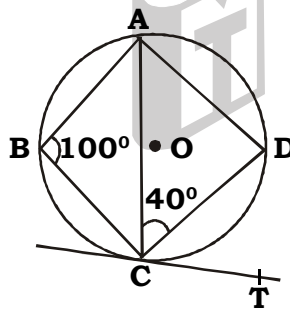


2013

1. In the given figure, $\angle BAD = 65^\circ$, $\angle ABD = 70^\circ$, $\angle BDC = 45^\circ$
 (i) Prove that AC is a diameter of the circle.
 (ii) Find $\angle ACB$.

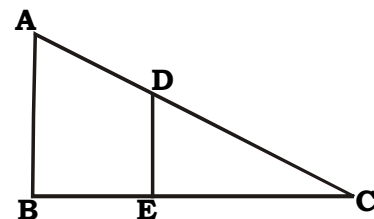


2. In the given circle with centre O. $\angle ABC = 100^\circ$, $\angle ACD = 40^\circ$ and CT is a tangent to the circle at C. Find $\angle ADC$ and $\angle DCT$.



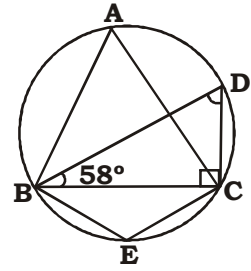
3. Using a ruler and compasses only :
 (i) Construct a triangle ABC with following data : AB = 3.5 cm, BC = 6 cm and $\angle ABC = 120^\circ$
 (ii) In the same diagram, draw a circle with BC as a diameter. Find a point P on the circumference of the circle which is equidistant from AB and BC.
 (iii) Measure $\angle BCP$.

4. In the given figure, AB and DE are perpendicular to BC.
 (i) Prove that $\triangle ABC \sim \triangle DEC$
 (ii) If AB = 6 cm, DE = 4 cm and AC = 15 cm. Calculate CD.
 (iii) Find the ratio of the area of $\triangle ABC$: area of $\triangle DEC$.

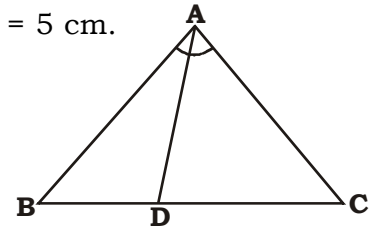


2014

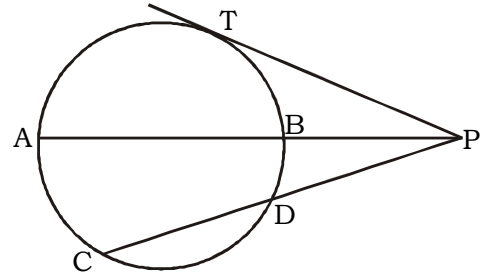
- In the figure, $\angle DBC = 58^\circ$. BD is a diameter of the circle. Calculate :
 (i) $\angle BDC$
 (ii) $\angle BEC$
 (iii) $\angle BAC$



- In $\triangle ABC$, $\angle ABC = \angle DAC$. $AB = 8$ cm, $AC = 4$ cm, $AD = 5$ cm.
 (i) Prove that $\triangle ACD$ is similar to $\triangle BCA$
 (ii) Find BC and CD
 (iii) Find area of $\triangle ACD$: area of $\triangle ABC$



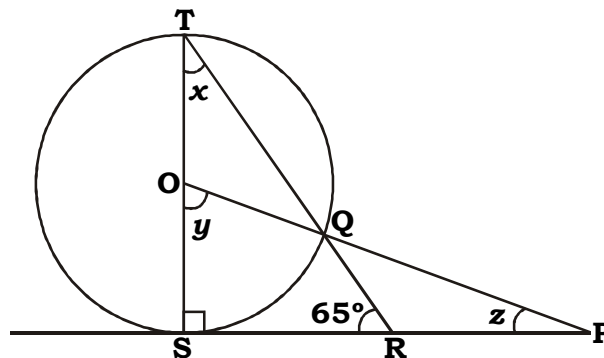
- In the figure given, diameter AB and chord CD of a circle meet at P. PT is a tangent to the circle at T. $CD = 7.8$ cm, $PD = 5$ cm, $PB = 4$ cm. Find :
 (i) AB
 (ii) the length of tangent PT.



- Construct a $\triangle ABC$ with $BC = 6.5$ cm, $AB = 5.5$ cm, $AC = 5$ cm. Construct the incircle of the triangle. Measure and record the radius of the incircle.

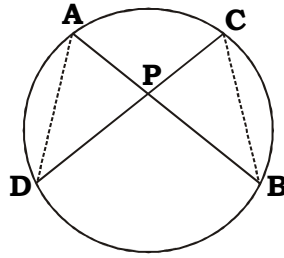
2015

- In the figure given below, O is the centre of the circle and SP is a tangent. If $\angle SRT = 65^\circ$, find the value of x , y and z .



- Construct a regular hexagon of side 5 cm. Construct a circle circumscribing the hexagon. All traces of construction must be clearly shown.

3. AB and CD are two chords of a circle intersecting at P.
Prove that $AP \times PB = CP \times PD$

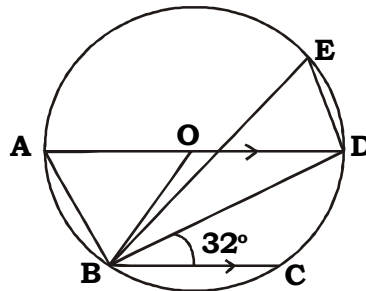


4. ABC is a right angled triangle with $\angle ABC = 90^\circ$. D is any point on AB and DE is perpendicular to AC. Prove that :
 (i) $\triangle ADE \sim \triangle ACB$
 (ii) If $AC = 13$ cm, $BC = 5$ cm and $AE = 4$ cm. Find DE and AD.
 (iii) Find Area of $\triangle ADE$: area of quadrilateral BCED.
5. Construct a triangle ABC with $AB = 5.5$ cm, $AC = 6$ and $\angle BAC = 105^\circ$.
Hence :
 (i) Construct the locus of points equidistant from BA and BC.
 (ii) Construct the locus of points equidistant from B and C.
 (iii) Mark the point which satisfies the above two loci as P. Measure and write the length of PC.

2016

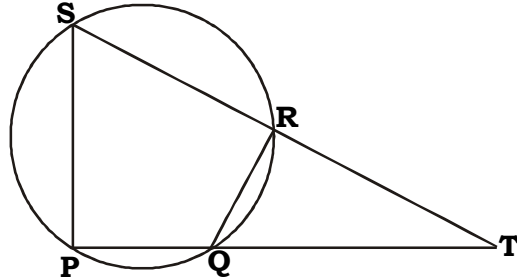
1. In the figure given below, AD is a diameter. O is the centre of the circle. AD is parallel to BC and $\angle CBD = 32^\circ$

- Find:
 (i) $\angle OBD$
 (ii) $\angle AOB$
 (iii) $\angle BED$



2. Use graph paper for this question. (Take 2 cm = 1 unit along both x and y axis.)
Plot the points O (0, 0), A (-4, 4), B (-3, 0) and C (0,-3)
 (i) Reflect points A and B on the y axis and name them A' and B' respectively.
Write down their coordinates.
 (ii) Name the figure OACB'A'.
3. Construct a regular hexagon of side 5 cm.

4. In the given figure PQRS is a cyclic quadrilateral PQ and SR produced meet at T.
- Prove $\Delta TPS \sim \Delta TRQ$.
 - Find SP if $TP = 18$ cm, $RQ = 4$ cm and $TR = 6$ cm.
 - Find area of quadrilateral PQRS if area of $\Delta PTS = 27$ cm².

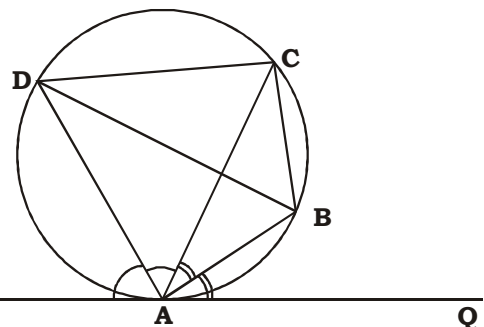


5. Draw a line $AB = 5$ cm. Mark a point C on AB such that $AC = 3$ cm. Using a ruler and a compass only, construct :
- A circle of radius 2.5 cm, passing through A and C.
 - Construct two tangents to the circle from the external point B. Measure and record the length of the tangents.
6. A model of a ship is made to a scale 1 : 300
- The length of the model of ship is 2 m. Calculate the length of the ship.
 - The area of the deck of the ship is 1,80,000 m². Calculate the area of the deck of the model.
 - The volume of the model is 6.5 m³. Calculate the volume of the ship.
7. Use ruler and compasses only for the following question. All construction lines and arcs must be clearly shown.
- Construct a ΔABC in which $BC = 6.5$ cm, $\angle ABC = 60^\circ$, $AB = 5$ cm.
 - Construct the locus of points at a distance of 3.5 cm from A.
 - Construct the locus of points equidistant from AC and BC.
 - Mark 2 points X and Y which are a distance of 3.5 cm from A and also equidistant from AC and BC. Measure XY.

2017

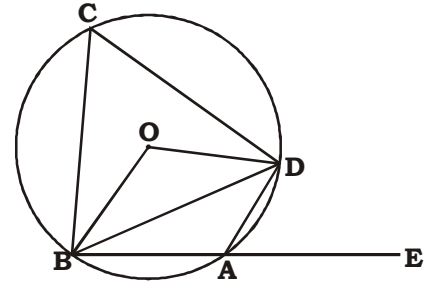
1. Using a ruler and a compass construct a triangle ABC in which $AB = 7$ cm, $\angle CAB = 60^\circ$ and $AC = 5$ cm. Construct the locus of :
- points equidistant from AB and AC.
 - points equidistant from BA and BC.

2. In the given figure PQ is a tangent to the circle at A. AB and AD are bisectors of $\angle CAQ$ and $\angle PAC$. If $\angle BAQ = 30^\circ$, prove that :
- BD is a diameter of the circle.
 - ABC is an isosceles triangle.



3. In the figure given, O is the centre of the circle.
 $\angle DAE = 70^\circ$. Find giving suitable reasons,
 the measure of :

- (i) $\angle BCD$
- (ii) $\angle BOD$
- (iii) $\angle OBD$



4. PQR is a triangle. S is a point on the side QR of ΔPQR such that
 $\angle PSR = \angle QPR$.

Given $QP = 8$ cm, $PR = 6$ cm and $SR = 3$ cm

- (i) Prove $\Delta PQR \sim \Delta SPR$
- (ii) Find the length of QR and PS
- (iii) $\frac{\text{area of } \Delta PQR}{\text{area of } \Delta SPR}$

